

# Enhanced PBO Fiber Reinforced Balloon Envelope Materials for Titan Aerobots, Phase I

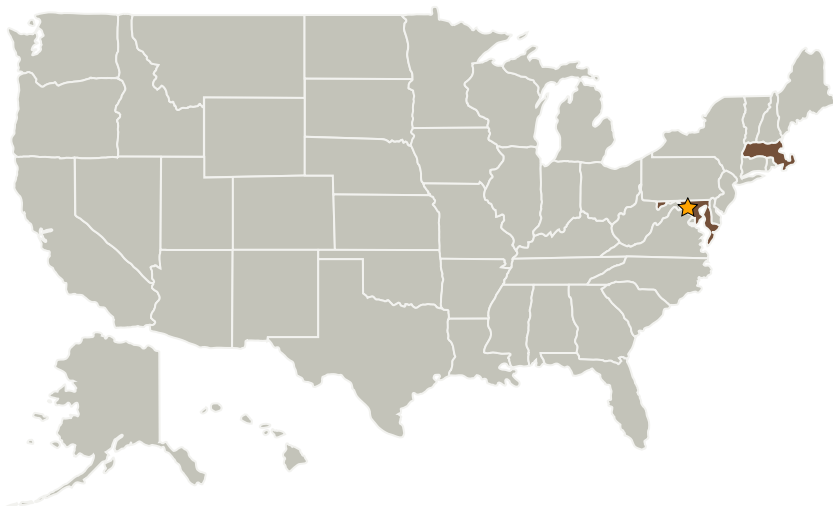
Completed Technology Project (2008 - 2008)



## Project Introduction

Lighter-than-atmosphere (LTA) systems provide significant advantages for planetary exploration due to their potential for extended mission duration, long traverse, and extensive surface coverage capabilities. However, LTA vehicles must withstand the atmosphere of these planets and moons. The atmosphere is often a challenging environment for the exterior balloon envelope materials primarily due to its extreme cold and complex chemistry. In this Phase I, Infoscitex (IST) will demonstrate the feasibility of fabricating a high specific strength fiber reinforced balloon material that can replace the currently marginally viable materials based on polyester film and fabric laminates. IST will develop an environmentally stable PBO fiber and use it to reinforce a new balloon envelope material that enables at least a 50% improvement in the strength to weight ratio while exceeding the flexibility to the current polyester materials in a Titan atmosphere. It is possible to achieve areal densities with this material that are in the range of 40 g/m<sup>2</sup> that can support both super pressure and zero pressure balloon concepts. During the Phase I program, IST will demonstrate the feasibility of the enhancing the PBO fiber with UV and hydrolysis protection via significant balloon material sample fabrication and cryogenic testing.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Goddard Space Flight Center (GSFC)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Infoscitex Corporation	Supporting Organization	Industry	Waltham, Massachusetts

Primary U.S. Work Locations	
Maryland	Massachusetts

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Robert Kovar

## Technology Areas

**Primary:**

- TX14 Thermal Management Systems
  - └ TX14.3 Thermal Protection Components and Systems
    - └ TX14.3.1 Thermal Protection Materials